SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-42

Name: Beaver Lake **County**: Yankton
Legal Description: T95N-R56W-Sec.27, 34
Location from nearest town: 2½ miles east and 2 miles north of Utica, SD

Dates of present survey: August 15-16, 2009
Dates of last survey: August 15-16, 2007

Primary Game Species	Other Species
Northern Pike	Black Bullhead
Black Crappie	Green Sunfish
Bluegill	Orange-spotted Sunfish
Walleye	Common Carp
	Largemouth Bass

PHYSICAL DATA

Surface Area: 72 acres **Watershed area**: 76,360 acres
Maximum depth: 10 feet **Mean depth**: 5 feet
Lake elevation at time of survey (from field observations): 12 inches low
Date the latest contour map was prepared: GFP shoreline map (2005).

Introduction

Beaver Lake (also known as State Lake) was formed by the construction of a dam across Beaver Creek in 1926. The lake was constructed by the South Dakota Department of Game, Fish and Parks (GFP) and named for the abundance of beaver that once inhabited the area. The Beaver Creek watershed drains into the lake then down the creek to the James River.

Ownership of Lake and Adjacent Lakeshore Properties

Existing records indicate that almost the entire lake basin and shoreline are owned by GFP. There are several private residences on the east side of the lake.

Fishing Access

There is a gravel boat ramp and parking area on the southwest corner of the lake. Shore fishing opportunities are currently limited, but a planned project will provide additional access near the face of the dam.

Field Observations of Water Quality and Aquatic Vegetation

The water in Beaver Lake was very turbid during the survey with a Secchi depth measurement of only 23 cm (9 in). A recent survey found up to eight feet of accumulated sediment in the lake. Thick stands of common cattail (*Typha spp.*) and river bulrush (*Scirpus fluviatilis*) were found around the entire lake.

BIOLOGICAL DATA

Methods:

Beaver Lake was sampled on August 11-12, 2009 with 5 overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads.

Results and Discussion:

Trap Net Catch

Black crappie (52.2%), bluegill (25.1%) and black bullhead (22.2%) were the most abundant species sampled in the trap nets (Table 1). Hybrid sunfish, orange-spotted sunfish and common carp were also sampled.

Table 1. Total catch from five overnight trap net sets at Beaver Lake, Yankton County, August 11-12, 2009.

Species	Number	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	683	52.2	136.6	±55.1	5.9	0	0	107
Bluegill	328	25.1	65.6	±34.8	3.9	0	0	102
Black Bullhead	290	22.2	58.0	±22.3	164.5	6	0	72
Hybrid Sunfish	4	0.3	0.8	±0.7	0.6	--	--	--
O.S. Sunfish	2	0.1	0.2	±0.5	10.9	--	--	--
Common Carp	1	0.1	0.2	±0.3	8.4	--	--	--

*Two years (2005, 2007)

Black Crappie

Management objective: To establish and maintain a black crappie population with a trap net CPUE of at least 25.

Black crappies were introduced in 2005 because the large areas of cattail and bulrushes in the lake are ideal crappie habitat. The crappies sampled this year ranged in length from 120 mm (4.7 in.) to 170 mm (6.7 in) (Figure 1) and appear to be from a large year class produced in 2008.

Table 2. Black crappie trap-net CPUE, PSD, RSD-P, and mean Wr for Beaver Lake, Yankton County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
CPUE						4.4		7.4		136.6
PSD						96		41		0
RSD-P						4		19		0
Mean Wr						119		119		107

Black Bullhead

Management objective: To maintain a bullhead population with a trap net CPUE of 100 or less.

Black bullhead abundance remains low and most fish are still quite small (Table 3) with a mean length of only 168 mm (6.6 in). In addition, the sampled fish were thin with a Wr of only 72. However, the presence of fish up to 25 cm (10 in) indicates the size structure of the population may improve if density remains low (Figure 2).

Table 3. Black bullhead trap-net CPUE, PSD, RSD-P, and mean Wr for Beaver Lake, Yankton County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
CPUE						251.0		78.0		58.0
PSD						12		1		6
RSD-P						0		0		0
Mean Wr						85		82		72

MANAGEMENT RECOMMENDATIONS

1. A project is currently planned to repair the spillway, install fishing piers and install a low-level outlet structure in late 2009 or early 2010. The outlet structure will allow periodic drawdowns or draining of the lake to eliminate rough fish populations, reduce sediment depths and manage aquatic habitat to benefit water quality and fish populations.

Table 4. Stocking record for Beaver Lake, Yankton County, 2004-2009.

Year	Number	Species	Size
2004	462	Northern Pike	Adult
2005	808	Black Crappie	Adult
	378	Northern Pike	Adult
2007	101,000	Walleye	Fry

In 2009 1,187 bluegills and 1,721 black crappies were transferred from Beaver Lake to other lakes and kids fishing ponds. Additional fish removals are planned before the lake is drained for spillway repairs.

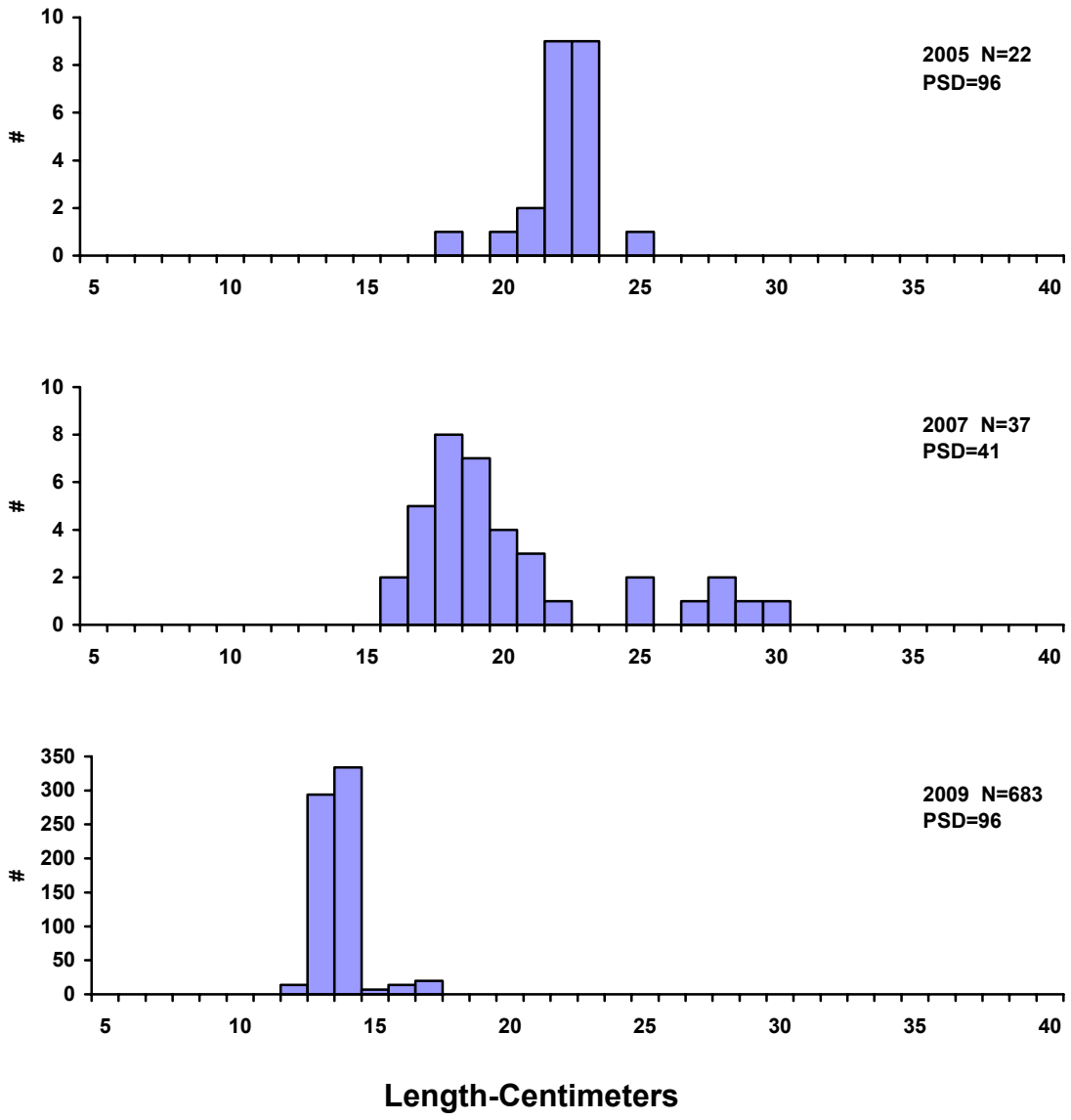

Figure 1. Length frequency histograms for black crappie sampled with trap nets in Beaver Lake, Yankton County, 2005, 2007 and 2009.

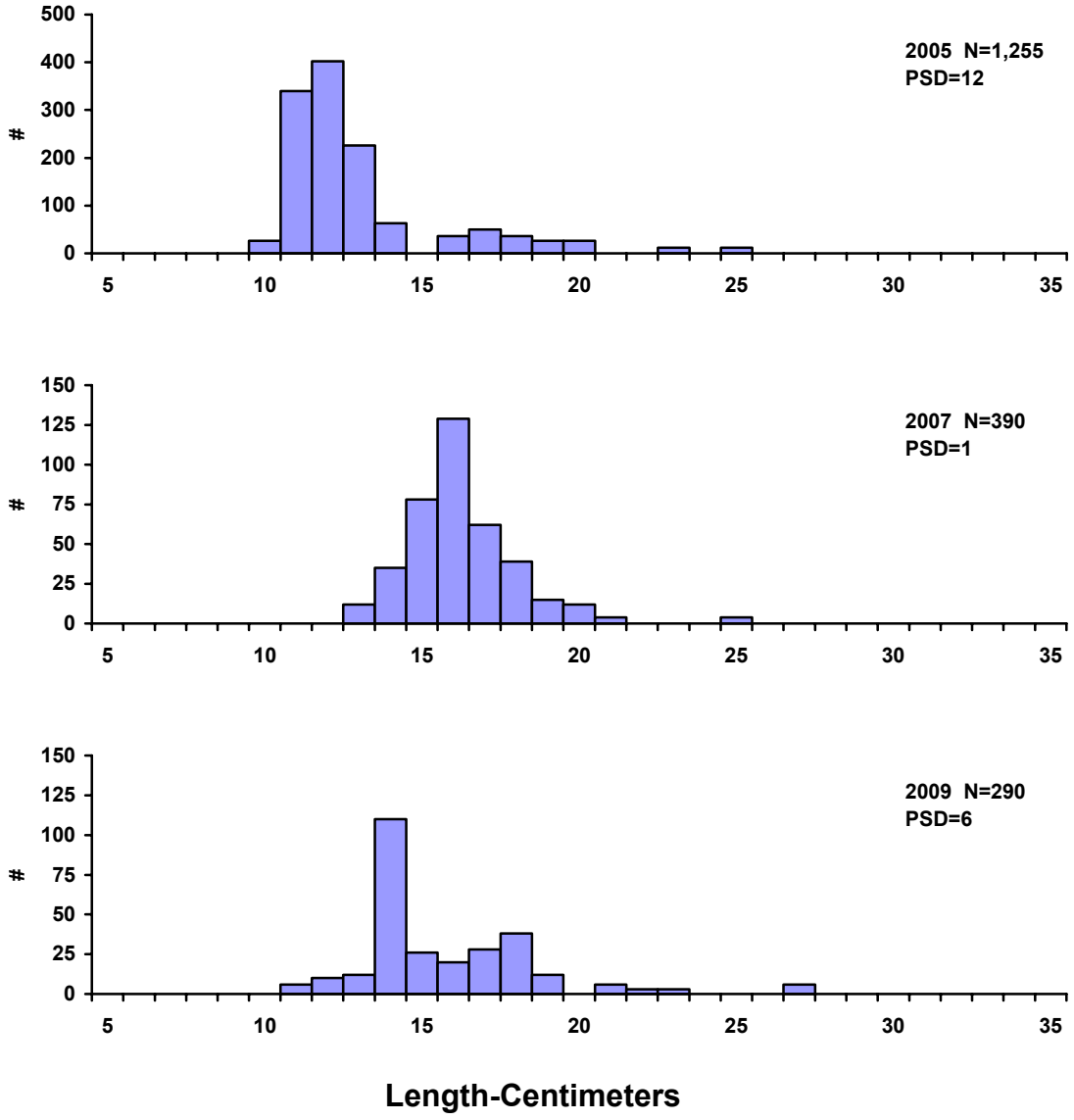

Figure 2. Length frequency histograms for black bullheads sampled with trap nets in Beaver Lake, Yankton County, 2005, 2007 and 2009.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.